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### **REMARKS**

This is a timely reply to the Office Action of July 17, 2002. In the Office Action, the Examiner allows Claims 40 - 43. The Examiner also rejects Claims 1 - 3, 5 - 12, 15 - 20, 23 - 27, 31 - 33 and 38 of the application. Finally, the Examiner objects to Claims 4, 13, 14, 21, 22, 28 - 30, 34 - 37 and 39. The grounds for rejection are traversed below.

#### **Claims Rejections - 35 U.S.C. § 102**

In Section 3 of the Office Action, the Examiner rejects Claims 1 - 3, 5, 6 and 23 - 27 under 35 U.S.C. 102(b) as being anticipated by Thaniyavarn (U.S. Patent 5,543,805). The Applicant respectfully disagrees that Thaniyavarn anticipates Claims 1 - 3, 5, 6 and 23 - 27 of the present application.

Turning now to the Examiner's rejections under 35 U.S.C. 102(b), the Examiner is reminded that "a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP 2131 quoting *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987) (underlining added for emphasis). Further, for Heflinger to be an anticipatory reference, "there must be no difference between the claimed invention and the reference disclosure, as viewed by one of ordinary skill in the field of the invention." *Scripps Clinic & Research Found. v. Genentech, Inc.*, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991). Therefore, to establish a *prima facie* case of anticipation, the Examiner must show how the single prior art reference teaches each and every as set forth in the rejected claims. The Applicant submits that the Examiner has not made such a showing and the Applicant further submits that the cited reference does not teach each and every element of the rejected claims.

In the Office Action, the Examiner asserts that Thaniyavarn discloses an optical system that "is comprised of the following: an optical laser source to provide an input, controllable phased-array beam director for coupling purposes (in electro-optically active substrate), control electrodes on

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either side of an optical substrate with a means to control the phase shift through each waveguided optic device into a plurality of output ports . . . .” The Examiner then concludes that the described high-speed, continuous beam steering device “fully meets the applicant’s claimed limitations.” The Examiner has merely concluded that the reference “meets the applicant’s claimed limitations,” but the Examiner has not shown how “each and every element as set forth in the claim is found, either expressly or inherently described,” in Thaniyavarn. The limitations of each claim rejected under 35 U.S.C. 102(b) are discussed below in relation to the assertions of the Examiner and the teachings of Thaniyavarn to show that the rejected claims are patentable over the cited reference.

#### Claim 1

Claim 1 recites, in part, “a controllable optical delay structure coupled to the optical pulse source, the optical delay structure providing a plurality of output optical pulse streams, each output optical pulse stream having a controllable time delay relative to the input optical pulse stream.” (Underlining added for emphasis). Where does Thaniyavarn teach a controllable time delay?

The Examiner summarizes Thaniyavarn as disclosing “means to control the phase shift,” but notes that Thaniyavarn states, at col. 6, lines 27 - 29, that “a variable time delay device can be combined with the invention.” However, this brief reference to a “variable time delay device” does not teach how the device can be combined with the invention. Is this device disposed at the input to the Thaniyavarn device, at the output, or incorporated somewhere within the invention? Clearly, this brief reference to a “variable time delay device” does not describe a “controllable optical delay structure coupled to the optical pulse source, the optical delay structure providing a plurality of output optical pulse streams, each output optical pulse stream having a controllable time delay relative to the input optical pulse stream” as recited in Claim 1. Hence, the Applicant submits that the Examiner has not established a *prima facie* case of anticipation of Claim 1 by Thaniyavarn.

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Thaniyavarn explicitly states that "the beam controller of the preferred embodiment provides phase shift, not time delay . . . ." (See Col. 6, lines 25 - 26). Hence, the explicit teachings of Thaniyavarn show that it does not teach "each output optical pulse stream having a controllable time delay relative to the input optical pulse stream" as recited in Claim 1. Further, the phase shift discussed in Thaniyavarn is a differential phase shift, where an optical signal with one polarization is phase shifted by a different amount than an optical signal with the other polarization. See col. 3, line 67, to col. 4, line 2. Hence, Thaniyavarn requires two optical signals at two different frequencies to provide the differential phase shift. Finally, Thaniyavarn discloses that the optical output is coherently combined to provide a microwave beat signal at the difference frequency and with a phase shift equal to the differential phase shift. See col. 4, lines 18 - 24.

The Applicant submits that Thaniyavarn does not teach and every limitation as recited in Claim 1. Specifically, the Applicant asserts that Thaniyavarn does not teach "a controllable optical delay structure coupled to the optical pulse source, the optical delay structure providing a plurality of output optical pulse streams, each output optical pulse stream having a controllable time delay relative to the input optical pulse stream" as recited in Claim 1. Therefore, the Applicant asserts that Claim 1 is patentable over Thaniyavarn and respectfully requests that the rejection of Claim 1 be withdrawn.

However, if the Examiner maintains the rejection of Claim 1 as being anticipated by Thaniyavarn, the Applicant respectfully requests that the Examiner, as required under 37 C.F.R. 1.104(c)(2), designate the particular part of Thaniyavarn relied on in rejecting Claim 1. Specifically, the Applicant requests that the Examiner show where or how Thaniyavarn anticipates Claim 1 by providing drawing reference numbers or specific portions of Thaniyavarn by column and line number that disclose each and every element of Claim 1.

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Claim 2

The Applicant asserts that Claim 2 is patentable over Thaniyavarn at least based upon its dependence on Claim 1. The Applicant further notes that Claim 2 recites, in part, "comprising an array of optical apertures." The Examiner has not cited a particular portion of Thaniyavarn that discloses such an array. Therefore, if the Examiner maintains the rejection of Claim 2, the Applicant respectfully requests that the Examiner designate the particular part or parts of Thaniyavarn that teach each and every element as recited in Claim 2.

Claim 3

The Applicant asserts that Claim 3 is patentable over Thaniyavarn at least based upon its indirect dependence on Claim 1. The Applicant further notes that Claim 3 recites, in part, "comprising an array of steerable optical apertures." The Examiner has not cited a particular portion of Thaniyavarn that discloses an array of steerable apertures. Therefore, if the Examiner maintains the rejection of Claim 3, the Applicant respectfully requests that the Examiner designate the particular part or parts of Thaniyavarn that teach each and every element as recited in Claim 3.

Claim 5

The Applicant submits that Claim 5 is patentable over Thaniyavarn at least based upon its dependence on Claim 1. The Applicant further notes that Claim 5 recites, in part, "an optical modulator modulating the unmodulated optical pulses with an information signal from the information signal source to produce the input optical pulse stream." The Examiner has not cited a particular portion of Thaniyavarn that discloses such an optical modulator. Therefore, if the Examiner maintains the rejection of Claim 5, the Applicant respectfully requests that the Examiner designate the particular part of Thaniyavarn that teaches each and every element as recited in Claim 5.

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Claim 6

The Applicant asserts that Claim 6 is patentable over Thaniyavarn at least based upon its indirect dependence on Claim 1.

Claim 23

The Applicant submits that Claim 23 is patentable over Thaniyavarn for the same reasons set forth above for Claim 1. That is, the Applicant submits that the Examiner has not established a *prima facie* case of anticipation based on Thaniyavarn, since the Examiner has not shown that each and every element as set forth in Claim 23 is disclosed in Thaniyavarn. Specifically, the Applicant submits that the Examiner has not shown "coupling the optical pulse stream into a controllable optical delay structure, the optical delay structure providing a plurality of delayed optical pulse streams, each delayed optical pulse stream having a controllable time delay relative to the input optical pulse stream" as recited in Claim 23. The Applicant further submits that Thaniyavarn does not disclose this limitation, since Thaniyavarn explicitly states that "the beam controller of the preferred embodiment provides phase shift, not time delay . . . ."

Therefore, the Applicant submits that Claim 23 is patentable over Thaniyavarn. However, if the Examiner maintains the rejection of Claim 23 as being anticipated by Thaniyavarn, the Applicant respectfully requests that the Examiner, as required under 37 C.F.R. 1.104(c)(2), designate the particular part of Thaniyavarn relied on in rejecting Claim 23. Specifically, the Applicant requests that the Examiner show where or how Thaniyavarn anticipates Claim 23 by providing drawing reference numbers or specific portions of Thaniyavarn by column and line number that disclose each and every element of Claim 23.

Claim 24

The Applicant submits that Claim 24 is patentable over Thaniyavarn at least based upon its dependence on Claim 23. The Applicant further notes that Claim 24 recites, in part, "the layer of electro-optically active material having multiple output ports disposed in a longitudinal

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direction.” The Examiner has not cited a particular portion of Thaniyavarn that discloses such a limitation, nor has the Examiner cited portions of Thaniyavarn that disclose the other limitations recited in Claim 24. Therefore, if the Examiner maintains the rejection of Claim 24, the Applicant respectfully requests that the Examiner designate the particular part or parts of Thaniyavarn that teach each and every element as recited in Claim 24.

Claim 25

The Applicant submits that Claim 25 is patentable over Thaniyavarn at least based upon its indirect dependence on Claim 23. The Applicant further notes that Claim 25 recites, in part, “the bulk substrate having an upper internally reflective surface and a lower internally reflective surface wherein the optical pulse stream propagates in the longitudinal direction of the layer by successively reflecting between the internally reflective surfaces.” The Examiner has not cited a particular portion of Thaniyavarn that discloses such a limitation. Therefore, if the Examiner maintains the rejection of Claim 25, the Applicant respectfully requests that the Examiner designate the particular part or parts of Thaniyavarn that teach each and every element as recited in Claim 25.

Claim 26

The Applicant submits that Claim 26 is patentable over Thaniyavarn at least based upon its indirect dependence on Claim 23. The Applicant further notes that Claim 26 recites, in part, “the layer of electro-optically active material comprises a guided-wave electro-optic device having an upper surface and a lower surface generally parallel to each other, wherein the optical pulse stream propagates in the longitudinal direction of the layer in a direction generally parallel to the surfaces.” The Examiner has not cited a particular portion of Thaniyavarn that discloses such a limitation. Therefore, if the Examiner maintains the rejection of Claim 26, the Applicant respectfully requests that the Examiner designate the particular part or parts of Thaniyavarn that teach each and every element as recited in Claim 26.

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Claim 27

The Applicant submits that Claim 27 is patentable over Thaniyavarn at least based upon its indirect dependence on Claim 23. The Applicant further notes that Claim 27 recites, in part, "said each output port of said multiple output ports is located equidistantly from adjoining output ports." The Examiner has not cited a particular portion of Thaniyavarn that discloses such a limitation. Therefore, if the Examiner maintains the rejection of Claim 27, the Applicant respectfully requests that the Examiner designate the particular part or parts of Thaniyavarn that teach each and every element as recited in Claim 27.

Claims Rejections - 35 U.S.C. § 103

In Section 7, the Examiner rejects Claims 7 - 12, 15 - 20, 31 - 33 and 38 under 35 U.S.C. 103(a) as being unpatentable over Thaniyavarn and further in view of Dugan et al. (U.S. Patent No. 6,157,475). The Examiner notes that Thaniyavarn does not teach tapped output couplers, but asserts that Dugan discloses "the use of a plurality of tapped output couplers in order to provide feedback and channel regulation for his optical device, the general purpose of the tapped output couplers being to regulate an optical system using information obtained as an optical signal." The Examiner further asserts that since Thaniyavarn and Dugan are both from the same field of endeavor, "the purpose disclosed by Dugan would have been recognized in the pertinent art of Thaniyavarn."

The Examiner is reminded that to establish a *prima facie* case of obviousness, three criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP 2142 (underlining added for emphasis). The Applicant submits that the Examiner has failed to satisfy these criteria in asserting that the rejected claims are obvious in view of Thaniyavarn combined with Dugan.

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The Examiner is further reminded that “the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.” MPEP2143.01 citing *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). The Examiner is also reminded that “the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant’s disclosure.” MPEP 2143 citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The Applicant submits that any motivation to combine Thaniyavarn with Dugan is provided by the Applicant’s disclosure, and not by the prior art.

Even though the Examiner asserts that Thaniyavarn and Dugan are “both from the same field of endeavor,” they clearly are not. Dugan relates to optical communication systems and, more specifically, to optical communication systems in guided-wave structures. Thaniyavarn relates to radio frequency (RF) systems and, more specifically, beam steering of a RF signal in free space. The fact that Thaniyavarn discloses that light is used to generate the RF signal does not imply that one skilled in the art dealing with the problem of free-space beam steering of RF beams as addressed by Thaniyavarn would look to the technology of all-fiber-based optical communication links as addressed by Dugan (or vice versa). More specifically, what problem would one skilled in the art be attempting to solve by combining the teachings of Thaniyavarn with Dugan?

The Examiner asserts that “feedback information obtained by the use of tapped output couplers in order to regulate an optical signal could be used to implement any optical system,” but Thaniyavarn does not disclose or even suggest a need for “feedback information” or regulation of the optical signal. Further, where is the reasonable expectation of success? Dugan discloses an optical channel regulator method that reduces problems associated with previously developed optical channel regulation schemes, but there is no indication that such a method will even work with the RF system of Thaniyavarn. Clearly, the Examiner has combined these two references only because the references can be combined. Therefore, the only motivation or suggestion to



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combine the references must be based upon the Applicant's disclosure and, more specifically, must be based upon the recitation of "tapped output couplers" in the rejected claims.

Hence, the Applicant submits that the rejection of Claims 7 - 12, 15 - 20, 31 - 33 and 38 under 35 U.S.C. 103(a) as being unpatentable over Thaniyavarn and further in view of Dugan is improper. The Applicant respectfully requests that the rejection of these claims on this grounds be withdrawn. If the Examiner maintains the rejection of Claims 7 - 12, 15 - 20, 31 - 33 and 3 on this grounds, the Applicant respectfully requests that the Examiner show how the combination of the references teach and every element of the rejected claims. The elements of the claims rejected under 35 U.S.C. 103(a) are addressed in additional detail below.

#### Claims 7 - 12

The Examiner rejects Claims 7 - 12 as being made obvious by Thaniyavarn in view of Dugan, but provides little description of how this combination teaches each and every element of these rejected claims. For example, the Examiner has not shown how the combination teaches, discloses, or suggests "said tapped output couplers disposed in a linear direction from the proximal end to the distal end of the layer of electro-optically active material, each tapped output coupler of the plurality of tapped output couplers disposed in an increasing distance from the proximal end to the distal end of the electro-optically active material," as recited in Claim 7. Nor has the Examiner shown how the combination teaches "the bulk substrate having an upper internally reflective surface and a lower internally reflective surface" as recited in Claim 8. Nor has the Examiner shown how the combination teaches "a guided-wave electro-optic device having an upper surface and a lower surface generally parallel to each other" as recited in Claim 9. Nor has the Examiner shown how the combination teaches "a first electrode located on a first side of the layer . . . a second electrode located on a second side of the layer" as recited in Claim 10. Nor has the Examiner shown how the combination teaches "a first plurality of electrodes located on a first side of the layer . . . a second plurality of electrodes located on a second side of the layer" as recited in Claim 11. Finally, the Examiner has not shown how the combination teaches "each

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tapped output coupler is located equidistant from adjoining tapped output couplers" as recited in Claim 12.

The Applicant submits that, at least, the claim elements discussed above are not taught, described, or suggested by the combination of Thaniyavarn and Dugan. Therefore, the Applicant submits that these claims are patentable over this combination. However, if the Examiner maintains the rejection of Claims 7 - 12 on this grounds, the Applicant respectfully requests that the Examiner show where or how the combination of Thaniyavarn and Dugan make obvious the rejected claims by citing drawing reference numbers or specific portions of the references by column and line number that disclose each and every element of the rejected claims.

Claims 15 - 20

The Examiner rejects Claims 15 - 20 as being made obvious by Thaniyavarn in view of Dugan, but provides little description of how this combination teaches each and every element of these rejected claims. For example, the Examiner has not shown how the combination teaches, discloses, or suggests "each tapped coupler in each line of tapped couplers disposed in an increasing distance from the proximal edge to the distal edge, and each line of tapped output couplers disposed in a linear direction from the leading edge to the trailing edge of the layer" as recited in Claim 15. Nor has the Examiner shown how the combination teaches "the bulk substrate structure having an upper internally reflective structure and a lower internally reflective structure" as recited in Claim 16. Nor has the Examiner shown how the combination teaches "a guided-wave electro-optic device having an upper surface and a lower surface generally parallel to each other" as recited in Claim 17. Nor has the Examiner shown how the combination teaches "a common electrode located on a second side of the layer" as recited in Claim 18. Nor has the Examiner shown how the combination teaches "a matrix of individually addressable electrodes located on a first side . . . , the electrodes separated from one another in two perpendicular directions" as recited in Claim 19. Finally, the Examiner has not shown how the combination

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teaches "each tapped output coupler . . . located equidistant from adjoining tapped output couplers" as recited in Claim 20.

The Applicant submits that, at least, the claim elements discussed above are not taught, described, or suggested by the combination of Thaniyavarn and Dugan. Therefore, the Applicant submits that these claims are patentable over this combination. However, if the Examiner maintains the rejection of Claims 15 - 20 on this grounds, the Applicant respectfully requests that the Examiner show where or how the combination of Thaniyavarn and Dugan make obvious the rejected claims by citing drawing reference numbers or specific portions of the references by column and line number that disclose each and every element of the rejected claims.

Claims 31 - 33 and 38

The Examiner rejects Claims 31 - 33 and 38 as being made obvious by Thaniyavarn in view of Dugan, but provides little description of how this combination teaches each and every element of these rejected claims. For example, the Examiner has not shown how the combination teaches, discloses, or suggests "a plurality of tapped output couplers providing optical beam outputs, the tapped output couplers disposed on the at least one layer in a linear direction from said proximal end to said distal end, each tapped output coupler of the plurality of tapped output couplers disposed in an increasing distance from the proximal end" as recited in Claim 31. Nor has the Examiner shown how the combination teaches "a first electrode located on a first side of the at least one layer; a second electrode located on a second side of the at least one layer opposite the first side" as recited in Claim 32. Nor has the Examiner shown how the combination teaches "a plurality of first electrode regions located on a first side of the at least one layer; a plurality of second electrode regions located on a second side of the at least one layer opposite the first side" as recited in Claim 33. Finally, the Examiner has not shown how the combination teaches "wherein tapped output couplers are disposed in several lines of couplers on the at least one layer of electro-optically active materia" as recited in Claim 38.

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The Applicant submits that, at least, the claim elements discussed above are not taught, described, or suggested by the combination of Thaniyavarn and Dugan. Therefore, the Applicant submits that these claims are patentable over this combination. However, if the Examiner maintains the rejection of Claims 31 - 33 and 38 on this grounds, the Applicant respectfully requests that the Examiner show where or how the combination of Thaniyavarn and Dugan make obvious the rejected claims by citing drawing reference numbers or specific portions of the references by column and line number that disclose each and every element of the rejected claims.

### Conclusion

Hence, the Applicant respectfully submits that all claims of the application are patentable over the cited references. In view of the above, reconsideration and allowance of the pending claims are respectfully solicited.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 12-0415. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 12-0415.

I hereby certify that this correspondence is being facsimile transmitted to the USPTO at FAX No. 703-872-9318 and addressed to: Commissioner for Patents, Washington, D.C. 20231 on

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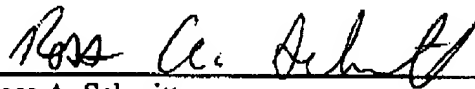


(Signature)

10-10-2002

(Date)

Respectfully submitted,



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DATE: October 10, 2002

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U.S. Application No. 09/877,976  
David M. Pepper  
"ELECTRO-OPTICAL PROGRAMMABLE TRUE-TIME . . ."  
Our Ref.: B-3918 617820-9

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**REMARKS:**

Attached is a formal response to the non-final Office Action mailed July 17, 2002 for the above-referenced application.

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